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(54) METHOD OF PROVIDING CONTENT TO A MOBILE WEB BROWSING DEVICE

EINE METHODE UM EINEM GERÄT ZUM WEB BROWSEN, INHALTE ZUR VERFÜGUNG ZU
STELLEN

PROCÉDÉ SERVANT À ALIMENTER EN CONTENU UN NAVIGATEUR WEB MOBILE

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Description

FIELD OF THE INVENTION

[0001] This invention relates to a method of providing content to a mobile web browsing device. A web browsing device is a device that can access content on remote computers, the data typically being stored in -a mark up language format such as HTML, WML etc. WAP/web pages are examples of content, but other kinds of content are also included.

DESCRIPTION OF THE PRIOR ART

[0002] Mobile web browsing devices are well known: the most common device type is a WAP/web enabled mobile cellular telephone.

[0003] WAP/web pages, or 'content', is held on a WAP/web server. Content that has been recently viewed on a device may be automatically cached in local device memory using the standard cache management approach within the HTTP/1.1 protocol (defined in RFC 2616). Hence, when a device is out of cellular network coverage, any WAP/web pages stored in the device cache memory will still be viewable on the device. However, most devices have limited memory, so that perhaps only the last 10-20 WAP pages can be automatically stored on the device. With current technology, content can also be cached on a phone for a given period of time. This time is set by the content creator - when it expires the browser is forced to reload the page from the WAP or internet site.

[0004] In order to improve the user experience, it is desirable to send and cache pre-defined content "pre-emptively" on subscribers' phones - i.e. to send pre-defined content automatically to a device without an explicit user request for that content. This removes the need for the browser to download WAP pages from the Internet, because they are already cached locally on the phone.

[0005] One technology for this is Dynamic Service Delivery from Cognima Limited. This technology however provides no feedback about what content a given user is looking at on the phone. Hence, there is currently no way to make intelligent decisions about what content should be pre-emptively sent to a particular user and automatically cached on the user's device.

[0006] Document US 2003/088580 discloses a method for a first computer to request documents from a second computer.

[0007] Jiang Z et al: "Web prefetching in a mobile environment", IEEE Personal Communications, IEEE Communications Society, US, vol. 5, no. 5, 1 October 1998 (1998-10-01), pages 25-34, ISSN: 1070-9916, DOI: 10.1109/98.729720, describes an adaptive network prefetch scheme comprising of a prediction module and a threshold module, which computes the access probabilities and prefetch thresholds respectively.

SUMMARY OF THE INVENTION

[0008] The invention provides a method, a mobile web browsing device, and a software application as set out in the accompanying claims.

DETAILED DESCRIPTION

[0009] The present invention is implemented as a two-way replication technology from Cognima Limited, London, United Kingdom. The identity of content from a remote server (e.g. a WAP or web server) that is being viewed by the user on a mobile telephone is logged locally on the phone and that information replicated back (subject to user approval) to a remote computer (the 'Cognima Server') over a wireless network. With this information, and knowledge of how fast a given WAP/web site is changing, the Cognima Server can make intelligent decisions about whether it is worth pre-emptively caching particular content on a given user's phone - i.e. automatically sending updated versions of that content for automatic storage in device memory (typically cache memory).

1. How it works

[0010] Cognima's Dynamic Service Delivery ('DSD') will measure what content is viewed on the phone and will log the time the user viewed it. Using Cognima's replication technology, this logging information will be replicated back to the Cognima Server. Further details of this replication technology can be seen in PCT/GB02/005308 and PCT/GB03/0055, the contents of which are incorporated by reference.

[0011] At the Cognima Server there are a set of WAP or Internet sites that the server has been instructed to look at. The server periodically reads these sites to see if the content on the site has changed, so the Server knows how fast and at what times the content on a given site changes. This could also be achieved by closer integration with a content site where a direct XML feed is sent to the Cognima Server, allowing the Cognima Server to be notified when a site changes.

[0012] Given these two measurements, when a site is updated the Cognima Server can calculate, on a per-user basis, if it is worth sending the data for the updated site to be pre-emptively cached on the phone. The following conditions would be taken into account for this calculation:

- How fast the site is changing - if the site changes much faster than users will typically access it, pre-emptive caching might make no sense (e.g. ball-by-ball cricket updates)
- How often the user views a given site - if they never look at it then the site is not worth caching
- What time of day it is-if we are in an off-peak GPRS time it may be less costly to transfer pages from the

site to the phone

- What day of the week it is - by measuring user activity over weeks or months, usage patterns can be deduced such that maybe a user is only likely to view a certain site on a weekend
- What the Operator wants to promote - they may have a certain site or sites they want to cache to make them more likely to be viewed

[0013] For all sites, or on a site-by-site basis, the Operator can set thresholds for all of the above conditions - and if all these thresholds are met the site is then pre-emptively cached on the phone. These thresholds are controlled at the server and so can be updated at any point by the Operator if they want to implement different caching strategies.

[0014] The key point is that without the user activity logging that is replicated back from the phone none of these calculations can be sensibly made on a per-user basis. With this system the content cached on a given phone is completely optimised for that user and no-one else.

2. User hints

[0015] Once the site has been cached on the phone it is possible to set up an API which allows the User Interface (UI) that displays the set of content links to be informed that a certain bit of content is or is not cached on the phone. The UI can then be changed in some way to show that a given site is cached and therefore that the user will get an "instant" viewing experience if they click on that link.

[0016] Another way this system could be implemented with no UI changes of the phone is to set up a set of locally cached menu of services which refer to locally cached pages on the phone - these would either contain the cache content or redirect the users to the external site if the site was not cached.

[0017] This allows content to be put pre-emptively on a phone on the basis that because it is instantly available a user will be more likely to click on it. Cognima allows such a hypothesis to be tested using the stats function described below.

3. Measuring how the system works

[0018] Cognima logs information about what sites are being viewed on the device and can replicate that information to the Cognima Server. One extra bit of information that can be included is whether the site that the user views was cached on the phone or not. This data can be used to produce some very interesting statistics for Cognima's customers:

- The number of cached sites that were viewed. This translates directly to how much the user experience for the user was improved. Knowing the average

download time of a site could also translate directly into the number of minutes of waiting time the user has been saved.

- Knowing the cached sites that have been viewed, it is possible to work out how much bandwidth (and this could be split into peak and off-peak bandwidth) has been saved by the Operator - i.e. when the user views a cached site the download of that data has been saved. As Cognima pre-emptively cached the site on the phone in the first place, it knows exactly how much data the transfer of the site would have taken.

[0019] Depending on the caching strategy chosen by the Operator, the overall bandwidth usage may actually increase, because some pages may be downloaded to users who never look at them. However the DSD system will move the majority of this data traffic from peak to off-peak periods, filling bandwidth troughs and reducing peaks, and so the marginal cost of transferring this data is close to zero. Peak bandwidth is saved because users no longer need to download WAP pages in real-time during peak hours; the pages will have been cached in advance on their phones during the preceding off-peak period.

[0020] These figures are more than just interesting information for Network Operators. New caching strategies can be tried out and the effect on both the customer experience and the bandwidth used can be measured.

4. Cache expiration

[0021] Because the Cognima server knows how often a site is updated (and this may change depending on the time of day or day of the week) it can make a calculation of how long the cached data on the phone should stay cached before the data is removed and the phone goes back to using normal WAP or Website download.

[0022] For example if a site changes only once a day at 4pm generally then when the content is cached on the phone this system will assign an expiration time of 4pm the following day for that site. The Cognima server can determine how often a site is updated by starting with a default sampling rate (perhaps twice a day) and if the data has not changed in that time, the sampling rate could be doubled and if it has, the sampling rate could be halved.

[0023] It is also possible for the Cognima Server to examine a site and see that a site has not been updated and so it can extend the cache expiry time for the cached content on a phone by replicating just that information to the phone. In this case the content is already on the phone and so there is no need to download it to the phone again and so more bandwidth has been saved.

5. User Scenario

[0024] A typical user scenario for DSD is outlined be-

low:

- The Operator wishes to promote a new teen WAP site that updates daily
- Cognima DSD caches all or part of the WAP site in advance on phones belonging to subscribers within the target market segment
- A menu update is sent to these subscribers' phones, creating a WAP link in the top-level phone menu
- When a subscriber clicks on the new link in the phone menu, the phone's WAP browser is launched and instantly displays pages from the local cached copy of the WAP site
- If the subscriber follows a link to a page that has not been cached, the browser connects via WAP to the Internet and downloads the page to the phone as for any normal WAP page
- WAP site updates are cached nightly on subscribers' phones (if a subscriber's phone is switched off throughout the update period, then the cache will expire); each morning, subscribers will get instant access on their phones to the latest version of the WAP site
- Whenever subscribers access cached WAP pages on the phone, Cognima records their actions in usage logs that are replicated back to the server on a daily basis using off-peak bandwidth
- After a few days, the Cognima Server stops caching WAP pages for those subscribers that have shown little interest in accessing the site; the precise rules for this can be defined by the Operator
- After a few weeks, the Operator ends its promotion of the WAP site and removes the link from the main menu on subscribers' phones
- However, the Operator continues to cache the site for heavy users, and may even deliver them a custom menu so that the WAP link remains available.

6. Caching Strategies

[0025] With this system a number of caching strategies are possible ranging from simple models to ones involving prediction of exactly when a site might change and calculation of the cost/benefit of caching the site. A few of the simpler examples are shown below. Because this system would potentially modify user behaviour the only way to be certain which one would be the best would be to test it on real users.

6.1 Simple daily update

[0026] In this model the idea is that a set of cached sites are updated overnight using off-peak bandwidth. The decision about what to cache is made on the basis that a site is only worth caching if:

1. The user accesses the site quite frequently
AND
2. The site does not change too often

[0027] On the server the operator sets two thresholds:

Ta = minimum number of times a user needs to access a given site per week
Tc = maximum number of times a given site can change per week so if the user has the following usage:

a = no of times user access a given site per week
c = no of times given site changes per week

then the site would only be cached if:

$$(a > Ta) \text{ AND } (c < Tc)$$

6.2 Fixed cached allocation

[0028] In this strategy some cached sites are updated overnight, some every few days overnight, but even fast changing sites are cached on the phone. The hypothesis here is that even though the site changes every hour or so (e.g. a new headline appears) the user is still interested in browsing news-headlines that are up to a day old. For slower changing content like features and reviews, then users could be interested in things that are up to a week old. So for example the news headlines are cached over-night, and an on-line magazine is updated overnight every few days. Crucially the preemptively cached content is the teaser (or advert) which drives people to connect in order to get the full story.

[0029] One way to do this would be to decide what volume of data you want to put on the phone and cache a standard selection of content. Once the data is cached, if the user hasn't looked at it for more than a week or two, it is removed. This frees up a slot for some new content. Since the Cognima Server keeps track of what a user looks at, it can tag content and offer new content that the user may be interested in based on what they look at most often. In this way the selection of cached content starts off generic and gradually evolves towards their personal set of interests.

Claims

1. A method of providing content to a mobile web browsing device from a web server, comprising the steps of:
 - (a) receiving at a computer, remotely connected to the device over a wireless network, a log of data identifying content that has been viewed by the device;
 - (b) deciding at the remote computer whether to send or cause to be sent updated content stored on the web server to the device over the wireless network;
 - (c) automatically sending updated content stored on the web server to the device over the wireless network;
 - (d) causing that updated content to be automatically stored in device memory;

wherein the remote computer directly sends updated content to the device or causes the updated content to be sent to the device; and wherein the remote computer makes a decision whether or not to send, or cause to be sent, the updated content, by taking into account thresholds set for all the following conditions:

 - (i) how fast the content on the web server is changing;
 - (ii) how often the user views the content;
 - (iii) what time of day it is;
 - (iv) what day of the week it is;
 - (v) what an operator of the wireless network wants to promote;
 - (e) wherein the updated content is sent at off-peak periods; and
 - (f) wherein the remote computer further calculates how long the updated content is saved on the mobile device before the updated content is removed, wherein said calculating is based on knowledge at the remote computer about how often the content is updated at the web server.
2. The method of Claim 1 in which the log is generated at the device and replicated at the remote computer.
3. The method of Claim 1 in which the remote computer views multiple content from the web server and determines if the content has changed.
4. The method of Claim 1 in which the remote computer views multiple content from the web server and determines when the content has changed.
5. The method of Claim 1 in which the remote computer is notified by the web server if the content on the server has changed.
6. The method of Claim 1 in which the operator of the wireless network can set the thresholds.
7. The method of Claim 6 in which these thresholds are controlled at the remote computer and so can be updated at any point by the operator if it wants to implement different caching strategies.
8. The method of Claim 1 in which the remote computer determines how long the cached data on the phone should stay cached before the data is removed and the device goes back to using a normal download from the web server.
9. The method of Claim 1 in which the remote computer sends data to the device that automatically causes the device to display a link to new content, the new content being automatically stored on the device.
10. The method of Claim 1 in which the device includes a user interface that indicates whether given content is already stored in device memory or not.
11. The method of Claim 1 in which the log also records the time that a specific item of content was viewed by the device.
12. The method of Claim 1 in which the log identifies whether content that is being viewed is updated content that had earlier been stored in device memory.
13. A mobile web browsing device able to download and store content from a web server over a wireless network, wherein the device is programmed to:
 - (a) create a log of data identifying the content that is being viewed by the device;
 - (b) send that log to a remote computer;
 - (c) receive updated content stored on the web server over a wireless network;
 - (d) automatically store that updated content in memory

wherein updated content is sent directly from the remote computer to the device or is caused to be sent to the device; and wherein the remote computer makes a decision whether or not to send, or cause to be sent, the updated content, by taking into account thresholds set for all of the following conditions:

 - (i) how fast the content on the web server is changing;
 - (ii) how often the user views the content;
 - (iii) what time of day it is;
 - (iv) what day of the week it is;
 - (v) what an operator of the wireless network wants to promote,

- (e) wherein the updated content is sent at off-peak periods; and
 (f) wherein the remote computer further calculates how long the updated content is saved on the mobile device before the updated content is removed, wherein said calculating is based on knowledge at the remote computer about how often the content is updated at the web server. 5
14. A software application, programmed to allow a mobile web browsing device to download and display content from a web server over a wireless network, wherein the application is further programmed to: 10
- (a) log data identifying content that is being viewed by the device; 15
 (b) cause the log to be sent to a remote computer;
 (c) receive a notification that updated content has been received by the device; 20
 (d) cause that updated content to be automatically stored in device memory wherein updated content is sent directly from a remote computer to the device; and
 wherein the remote computer makes a decision whether or not to send, or cause to be sent, the updated content, by taking into account thresholds set for all of the following conditions: 25
- (i) how fast the content on the web server is changing; 30
 (ii) how often the user views the content;
 (iii) what time of day it is;
 (iv) what day of the week it is;
 (v) what an operator of the wireless network wants to promote; 35
- (e) wherein the updated content is sent at off-peak periods; and
 (f) wherein the remote computer further calculates how long the updated content is saved on the mobile device before the updated content is removed, wherein said calculating is based on knowledge at the remote computer about how often the content is updated at the web server. 40 45

Patentansprüche

1. Verfahren zum Bereitstellen von Inhalt zu einem mobilen Webbrowser-Gerät von einem Webserver, umfassend die folgenden Schritte: 50
- (a) Empfangen auf einem Computer, der mit dem Gerät remote über ein drahtloses Netzwerk verbunden ist, eines Protokolls von Daten, die Inhalt identifizieren, der von dem Gerät gesehen wurde; 55

- (b) Entscheiden auf dem Remotecomputer, ob aktualisierter Inhalt, der auf dem Webserver gespeichert ist, über das drahtlose Netzwerk zu dem Gerät gesendet werden soll oder das Senden veranlasst werden soll;
 (c) automatisches Senden von aktualisiertem Inhalt, der auf dem Webserver gespeichert ist, über das drahtlose Netzwerk zu dem Gerät;
 (d) Veranlassen, dass aktualisierter Inhalt automatisch im Gerätespeicher gespeichert wird; wobei der Remotecomputer aktualisierten Inhalt direkt zu dem Gerät sendet oder veranlasst, dass der aktualisierte Inhalt zu dem Gerät gesendet wird; und
 wobei der Remotecomputer eine Entscheidung trifft, ob der aktualisierte Inhalt gesendet werden soll oder sein Senden veranlasst werden soll, durch Berücksichtigen von Schwellenwerten, die für alle der folgenden Bedingungen festgelegt sind:
- (i) wie schnell ändert sich der Inhalt auf dem Webserver;
 (ii) wie oft sieht der Benutzer den Inhalt an;
 (iii) welche Tageszeit ist es;
 (iv) welcher Tag der Woche ist es;
 (v) was will ein Betreiber des drahtlosen Netzwerks fördern;

- (e) wobei der aktualisierte Inhalt in Zeiten geringer Auslastung gesendet wird; und
 (f) wobei der Remotecomputer ferner berechnet, wie lange der aktualisierte Inhalt auf dem Mobilgerät gespeichert wird, bevor der aktualisierte Inhalt entfernt wird,

wobei das Berechnen auf dem Wissen auf dem Remotecomputer beruht, wie oft der Inhalt auf dem Webserver aktualisiert wird.

2. Verfahren nach Anspruch 1, wobei das Protokoll auf dem Gerät erzeugt wird und auf dem Remotecomputer repliziert wird.
3. Verfahren nach Anspruch 1, wobei der Remotecomputer vielfachen Inhalt von dem Webserver ansieht und bestimmt, ob sich der Inhalt geändert hat.
4. Verfahren nach Anspruch 1, wobei der Remotecomputer vielfachen Inhalt von dem Webserver ansieht und bestimmt, wann sich der Inhalt geändert hat.
5. Verfahren nach Anspruch 1, wobei der Remotecomputer von dem Webserver benachrichtigt wird, wenn sich der Inhalt auf dem Server geändert hat.
6. Verfahren nach Anspruch 1, wobei der Betreiber des drahtlosen Netzwerks die Schwellenwerte festlegen

kann.

7. Verfahren nach Anspruch 6, wobei diese Schwellenwerte auf dem Remotecomputer kontrolliert werden und so von dem Betreiber an jedem Punkt aktualisiert werden können, wenn er verschiedene Caching-Strategien implementieren möchte. 5
8. Verfahren nach Anspruch 1, wobei der Remotecomputer bestimmt, wie lange die gecached Daten auf dem Telefon gecached bleiben sollen, bevor die Daten entfernt werden und das Gerät wieder ein normales Herunterladen von dem Webserver verwendet. 10
9. Verfahren nach Anspruch 1, wobei der Remotecomputer Daten zu dem Gerät sendet, die das Gerät automatisch veranlassen, einen Link zu neuem Inhalt anzuzeigen, der automatisch auf dem Gerät gespeichert wird. 15
10. Verfahren nach Anspruch 1, wobei das Gerät eine Benutzeroberfläche enthält, die angibt, ob ein gegebener Inhalt bereits im Gerätespeicher gespeichert ist oder nicht. 20
11. Verfahren nach Anspruch 1, wobei das Protokoll auch die Zeit aufzeichnet, während der ein spezifischer Inhalt von dem Gerät angesehen wurde. 25
12. Verfahren nach Anspruch 1, wobei das Protokoll identifiziert, ob Inhalt, der angesehen wird, aktualisierter Inhalt ist, der früher im Gerätespeicher gespeichert wurde. 30
13. Mobiles Webbrowser-Gerät, das in der Lage ist, Inhalt über ein drahtloses Netzwerk von einem Webserver herunterzuladen und zu speichern, wobei das Gerät zu Folgendem programmiert ist: 35
 - (a) Erstellen eines Protokolls von Daten, die den Inhalt identifizieren, der von dem Gerät angesehen wird; 40
 - (b) Senden dieses Protokolls zu einem Remotecomputer; 45
 - (c) Empfangen von aktualisiertem Inhalt, der auf dem Webserver gespeichert ist, über ein drahtloses Netzwerk; 50
 - (d) automatisches Speichern dieses aktualisierten Inhalts in einem Speicher, wobei aktualisierter Inhalt direkt von dem Remotecomputer zu dem Gerät gesendet wird oder veranlasst wird, zu dem Gerät gesendet zu werden; und 55
 - wobei der Remotecomputer eine Entscheidung trifft, ob der aktualisierte Inhalt gesendet werden soll oder sein Senden veranlasst werden soll, durch Berücksichtigen von Schwellenwerten, die für alle der folgenden Bedingungen festge-

legt sind:

- (i) wie schnell ändert sich der Inhalt auf dem Webserver;
 - (ii) wie oft sieht der Benutzer den Inhalt an;
 - (iii) welche Tageszeit ist es;
 - (iv) welcher Tag der Woche ist es;
 - (v) was will ein Betreiber des drahtlosen Netzwerks fördern;
- (e) wobei der aktualisierte Inhalt in Zeiten geringer Auslastung gesendet wird; und
- (f) wobei der Remotecomputer ferner berechnet, wie lange der aktualisierte Inhalt auf dem Mobilgerät gespeichert wird, bevor der aktualisierte Inhalt entfernt wird, wobei das Berechnen auf dem Wissen auf dem Remotecomputer beruht, wie oft der Inhalt auf dem Webserver aktualisiert wird.
14. Software-Anwendung, die programmiert ist, um einem mobilen Webbrowser-Gerät zu erlauben, Inhalt über ein drahtloses Netzwerk von einem Webserver herunterzuladen und anzuzeigen, wobei die Anwendung ferner zu Folgendem programmiert ist:
 - (a) Protokollieren von Daten, die Inhalt identifizieren, der von dem Gerät gesehen wird;
 - (b) Veranlassen, dass das Protokoll zu einem Remotecomputer gesendet wird;
 - (c) Empfangen einer Benachrichtigung, dass aktualisierter Inhalt von dem Gerät empfangen wurde;
 - (d) Veranlassen, dass aktualisierter Inhalt automatisch im Gerätespeicher gespeichert wird, wobei aktualisierter Inhalt direkt von einem Remotecomputer zu dem Gerät gesendet wird; und wobei der Remotecomputer eine Entscheidung trifft, ob der aktualisierte Inhalt gesendet werden soll oder sein Senden veranlasst werden soll, durch Berücksichtigen von Schwellenwerten, die für alle der folgenden Bedingungen festgelegt sind:
 - (i) wie schnell ändert sich der Inhalt auf dem Webserver;
 - (ii) wie oft sieht der Benutzer den Inhalt an;
 - (iii) welche Tageszeit ist es;
 - (iv) welcher Tag der Woche ist es;
 - (v) was will ein Betreiber des drahtlosen Netzwerks fördern;
 - (e) wobei der aktualisierte Inhalt in Zeiten geringer Auslastung gesendet wird; und
 - (f) wobei der Remotecomputer ferner berechnet, wie lange der aktualisierte Inhalt auf dem Mobilgerät gespeichert wird, bevor der aktualisierte Inhalt entfernt wird, wobei das Berechnen

auf dem Wissen auf dem Remotecomputer beruht, wie oft der Inhalt auf dem Webserver aktualisiert wird.

Revendications

1. Procédé de fourniture de contenu à un dispositif de navigation web mobile à partir d'un serveur web, comprenant les étapes ci-dessous consistant à :

(a) recevoir, au niveau d'un ordinateur, connecté à distance au dispositif sur un réseau sans fil, un journal de données identifiant du contenu qui a été visionné par le dispositif ;
 (b) décider, au niveau de l'ordinateur distant, s'il convient d'envoyer un, ou d'occasionner l'envoi d'un contenu mis à jour stocké sur le serveur web au dispositif sur le réseau sans fil ;
 (c) envoyer automatiquement le contenu mis à jour stocké sur le serveur web au dispositif sur le réseau sans fil ;
 (d) amener ce contenu mis à jour à être automatiquement stocké dans la mémoire du dispositif ;
 dans lequel l'ordinateur distant envoie directement le contenu mis à jour au dispositif, ou amène le contenu mis à jour à être envoyé au dispositif ; et
 dans lequel l'ordinateur distant prend la décision d'envoyer ou non, ou de faire envoyer ou non, le contenu mis à jour, en tenant compte de seuils définis pour la totalité des conditions suivantes :

- (i) la vitesse à laquelle le contenu sur le serveur web varie ;
 (ii) la fréquence à laquelle l'utilisateur visionne le contenu ;
 (iii) l'heure de la journée ;
 (iv) le jour de la semaine ;
 (v) ce qu'un opérateur du réseau sans fil souhaite promouvoir ;

(e) dans lequel le contenu mis à jour est envoyé au cours de périodes d'heures creuses ; et
 (f) dans lequel l'ordinateur distant calcule en outre combien de temps le contenu mis à jour est sauvegardé sur le dispositif mobile avant que le contenu mis à jour ne soit supprimé, dans lequel ledit calcul est basé sur une connaissance, au niveau de l'ordinateur distant, de la fréquence à laquelle le contenu est mis à jour au niveau du serveur web.

2. Procédé selon la revendication 1, dans lequel le journal est généré au niveau du dispositif et est répliqué au niveau de l'ordinateur distant.

3. Procédé selon la revendication 1, dans lequel l'ordinateur distant visionne plusieurs contenus en provenance du serveur web et détermine si le contenu a changé.

4. Procédé selon la revendication 1, dans lequel l'ordinateur distant visionne plusieurs contenus en provenance du serveur web et détermine quand le contenu a changé.

5. Procédé selon la revendication 1, dans lequel l'ordinateur distant est notifié par le serveur web si le contenu sur le serveur a changé.

6. Procédé selon la revendication 1, dans lequel l'opérateur du réseau sans fil peut définir les seuils.

7. Procédé selon la revendication 6, dans lequel ces seuils sont commandés au niveau de l'ordinateur distant, et ils peuvent par conséquent être mis à jour à tout moment par l'opérateur s'il souhaite mettre en oeuvre différentes stratégies de mise en mémoire cache.

8. Procédé selon la revendication 1, dans lequel l'ordinateur distant détermine combien de temps les données mises en cache sur le téléphone doivent rester en mémoire cache avant que les données ne soient supprimées et que le dispositif revienne à l'utilisation d'un téléchargement normal à partir du serveur web.

9. Procédé selon la revendication 1, dans lequel l'ordinateur distant envoie des données au dispositif, ce qui amène automatiquement le dispositif à afficher un lien vers un nouveau contenu, le nouveau contenu étant automatiquement stocké sur le dispositif.

10. Procédé selon la revendication 1, dans lequel le dispositif inclut une interface utilisateur qui indique si un contenu donné est déjà stocké dans la mémoire du dispositif ou non.

11. Procédé selon la revendication 1, dans lequel le journal enregistre également l'heure à laquelle un élément de contenu spécifique a été visionné par le dispositif.

12. Procédé selon la revendication 1, dans lequel le journal identifie si le contenu visionné est un contenu mis à jour qui avait été précédemment stocké dans la mémoire du dispositif.

13. Dispositif de navigation web mobile en mesure de télécharger et de stocker du contenu à partir d'un serveur web sur un réseau sans fil, dans lequel le dispositif est programmé pour :

(a) créer un journal de données identifiant le

contenu qui est visionné par le dispositif ;
 (b) envoyer ce journal à un ordinateur distant ;
 (c) recevoir du contenu mis à jour stocké sur le serveur web sur un réseau sans fil ;
 (d) stocker automatiquement ce contenu mis à jour dans une mémoire ; 5
 dans lequel le contenu mis à jour est envoyé directement de l'ordinateur distant au dispositif, ou est amené à être envoyé au dispositif ; et 10
 dans lequel l'ordinateur distant prend la décision d'envoyer ou non, ou de faire envoyer ou non, le contenu mis à jour, en tenant compte de seuils définis pour la totalité des conditions suivantes :

- (i) la vitesse à laquelle le contenu sur le serveur web varie ; 15
- (ii) la fréquence à laquelle l'utilisateur visionne le contenu ;
- (iii) l'heure de la journée ;
- (iv) le jour de la semaine ; 20
- (v) ce qu'un opérateur du réseau sans fil souhaite promouvoir ;

(e) dans lequel le contenu mis à jour est envoyé au cours de périodes d'heures creuses ; et 25
 (f) dans lequel l'ordinateur distant calcule en outre combien de temps le contenu mis à jour est sauvegardé sur le dispositif mobile avant que le contenu mis à jour ne soit supprimé, dans lequel ledit calcul est basé sur une connaissance, au niveau de l'ordinateur distant, de la fréquence à laquelle le contenu est mis à jour au niveau du serveur web. 30

14. Application logicielle, programmée de manière à 35
 permettre à un dispositif de navigation web mobile de télécharger et d'afficher du contenu en provenance d'un serveur web sur un réseau sans fil, dans laquelle l'application est en outre programmée de manière à : 40

- (a) journaliser des données identifiant du contenu qui est visionné par le dispositif ;
- (b) occasionner l'envoi du journal à un ordinateur distant ; 45
- (c) recevoir une notification indiquant que du contenu mis à jour a été reçu par le dispositif ;
- (d) amener ce contenu mis à jour à être automatiquement stocké dans la mémoire du dispositif ; 50
- dans lequel le contenu mis à jour est envoyé directement d'un ordinateur distant au dispositif ; et
- dans lequel l'ordinateur distant prend la décision d'envoyer ou non, ou de faire envoyer ou non, le contenu mis à jour, en tenant compte de seuils définis pour la totalité des conditions suivantes : 55

- (i) la vitesse à laquelle le contenu sur le serveur web varie ;
- (ii) la fréquence à laquelle l'utilisateur visionne le contenu ;
- (iii) l'heure de la journée ;
- (iv) le jour de la semaine ;
- (v) ce qu'un opérateur du réseau sans fil souhaite promouvoir ;

(e) dans lequel le contenu mis à jour est envoyé au cours de périodes d'heures creuses ; et
 (f) dans lequel l'ordinateur distant calcule en outre combien de temps le contenu mis à jour est sauvegardé sur le dispositif mobile avant que le contenu mis à jour ne soit supprimé, dans lequel ledit calcul est basé sur une connaissance, au niveau de l'ordinateur distant, de la fréquence à laquelle le contenu est mis à jour au niveau du serveur web.

REFERENCES CITED IN THE DESCRIPTION

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